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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,368	12/09/2003	Kenneth Boyd	81092489FGT1890	1367

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EXAMINER
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THORNEWELL, KIMBERLY A

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2128

DATE MAILED: 08/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/707,368	Applicant(s) BOYD ET AL.	
	Examiner Kimberly Thornewell	Art Unit 2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 December 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/9/2003</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

Claims 1-9 are pending in the instant application.

### *Information Disclosure Statement*

1. The information disclosure statement (IDS) submitted on 12/9/2003 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

### *Double Patenting*

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1 and 4 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 10, respectively, of copending Application No. 10/707,366, and over claims 1 and 12, respectively, of copending Application No. 10/707,365. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1 and 4 of the instant application contains every element of and therefore anticipates claims 1 and 10, and 1 and 12 of the copending applications.

Claim 1 of each application reads as follows:

<b>Copending App. 10/707,366</b>	<b>Instant Application Claim 1</b>	<b>Copending App. 10/707,365</b>
<b>Claim 1</b>		<b>Claim 1</b>

A simulation system for simulating an operation of an automotive vehicle comprising:	A simulation system for simulating an operation of an automotive vehicle comprising:	A simulation system for simulating an operation of an automotive vehicle comprising:
An input providing vehicle information and path information;	An input providing vehicle information and path information;	An input providing vehicle information and path information;
A controller having a vehicle computer model therein,	A controller having a vehicle computer model therein,	A controller having a vehicle computer model therein,

Said controller programmed to determine a <b>rear side slip angle of a vehicle computer model;</b>	Said controller programmed to determine a curvature of an intended path from the path information;	Said controller programmed to <b>determine an initial steering wheel angle input to the computer model;</b>
<b>When the rear side slip angle is greater than a threshold,</b> determine a look ahead scale factor;	Determine a look ahead scale factor as a function of the intended path;	<b>Determine a first steering wheel angle input to the computer model at a time later than the initial steering wheel angle input by comparing a look ahead point and an intended path;</b>
<b>When the rear side slip angle is greater than the threshold,</b> increase a look ahead point as a function of the look ahead scale factor;	Determine a look ahead point as a function of the look ahead scale factor;	
<b>Determine a steering wheel angle input to the computer model by comparing the look ahead point and the intended path;</b>		
Operate the computer model	Operate the computer model with	<b>When the vehicle model is</b>

with the steering wheel angle input; and	the steering wheel angle input; and	<b>understeering</b> , operate the computer model with the steering wheel angle input <b>until an error of the first steering wheel angle and the initial steering wheel angle is decreasing; When the error decreases</b> , operate the computer model with the first steering wheel angle input; and
Generate an output in response to the vehicle model and the initial steering wheel input or the first steering wheel input.	Generate an output in response to the vehicle model and the initial steering wheel input or the first steering wheel input.	Generate an output in response to the vehicle model and the initial steering wheel input or the first steering wheel input.

Claim 4 of the instant application and claim 10 of the copending application read as follows:

<b>Copending App. 10/707,366</b>  <b>Claim 10</b>	<b>Instant Application Claim 4</b>	<b>Copending App.</b>  <b>10/707,365 Claim 12</b>
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A method of operating a vehicle computer model having vehicle information and path information therein comprising:	A method of operating a vehicle computer model having vehicle information and path information therein comprising:	A method of operating a vehicle computer model having vehicle information and path information therein comprising:
Determining a <b>rear side slip angle of a vehicle computer model;</b>	Determining a curvature of an intended path from the path information;	Determining a <b>an initial steering wheel angle input to the computer model;</b>
<b>When the rear side slip angle is greater than a threshold,</b> determining a look ahead scale factor;	Determining a look ahead scale factor as a function of the intended path;	Determining a first steering wheel angle input to the computer model <b>at a time later than the initial steering wheel angle input</b> by comparing the look ahead point and an intended path;
<b>When the rear side slip angle is greater than the threshold, increasing</b> a look ahead point as a function of the look ahead scale factor;	Determining a look ahead point as a function of the look ahead scale factor;	

Determining a steering wheel angle input to the computer model by comparing the look ahead point and the intended path;	Determining a steering wheel angle input to the computer model by comparing the look ahead point and the intended path;	
Operating the computer model with the steering wheel angle input.	Operate the computer model with the steering wheel angle input;	<b>When the vehicle model is understeering,</b> operating the computer model with the steering wheel angle input; and <b>when the error decreases,</b> operating the computer model with the first steering wheel angle input.

As per claim 1, the claimed determining of a “rear side slip angle based of a vehicle computer model” of the copending application 10/707366 is not claimed in the instant application. The determining of a look ahead scale factor and increasing of a look ahead point “when the rear side slip angle is greater than a threshold” of the copending application 10/707366 is also not claimed in the instant application. Furthermore, the limitations of “initial steering wheel angle input, understeering, and error” in claim 1 of copending application 10/707365 are not claimed in the instant application. However, these limitations merely further



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define the system in claim 1 of the instant application, and the system of claim 1 of the instant application does not result in a different invention from that of the copending applications.

As per claim 4, the claimed determining of a “rear side slip angle based of a vehicle computer model” of the copending application 10/707366 is not claimed in the instant application. The determining of a look ahead scale factor and increasing of a look ahead point “when the rear side slip angle is greater than a threshold” of the copending application 10/707366 is also not claimed in the instant application. Furthermore, the limitations of “initial steering wheel angle input, understeering, and error” in claim 1 of copending application 10/707365 are not claimed in the instant application. However, these limitations merely further define the method in claim 1 of the instant application, and performing the method of claim 1 of the instant application does not result in a different invention from that of the copending applications.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Claim Objections***

4. Claims 1, 8, and 17 are objected to because of the following informalities:

Claim 1, line 13 should read, “*determine* a steering wheel angle input...”

Claim 8, although directed to a system, appears to read like a method step. Furthermore, “that the threshold” in line 2 should read “than the threshold.”

Claim 17 appears to be directed to an additional method step. Therefore, the word “wherein” in line 1 should be replaced with the phrase “further comprising.” Furthermore, “that the threshold” in line 2 should read “than the threshold.”

Appropriate correction is required.

### ***Claim Objections***

5. Claims 2, 5, and 8 are objected to because of “a curvature of the intended path” should read, “*the* curvature of the intended path.” Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 7-9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The last limitation of claim 7 reads, “when the vehicle is on target, maintaining a *previously determined* steering wheel angle.” However, according to the claim, a steering wheel angle is only determined when the vehicle is not on target. Therefore, if the vehicle were always on target, then there would be no “previously determined” steering wheel angle to maintain.

Claims 8 and 9 are rejected, as they are dependent from claim 7, and do not overcome the issue of there not necessarily being a “previously determined” steering wheel angle to maintain.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-3, 6, and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the initial steering wheel input or the first steering wheel input" in the last two lines of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim 2 is rejected because of its dependence from claim 1.

Claim 3 is rejected because of its dependence from claim 1, and further because it recites the limitation “a maximum scale factor.” One of ordinary skill in the art cannot determine a “maximum” scale factor without a clear definition from the claim language or the specification.

Claims 6 and 9, similar to claim 3 above, is rejected because it also recites the limitation “a maximum scale factor.” Again, one of ordinary skill in the art cannot determine a “maximum” scale factor without a clear definition from the claim language or the specification.

### ***Claim Rejections - 35 USC § 101***

10. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 10-18 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 10 is directed to a method of operating a vehicle computer model. This claim is interpreted to be software, per se. The method results in determining a steering wheel angle input, and operating the computer model with the steering wheel angle input. However, the Applicant has not disclosed a tangible way in which the model is operated. Dependent claims 11-18 are rejected because they also do not set forth a tangible way in which to operate a computer model.

***Claim Rejections - 35 USC § 102***

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1, 2, 4, 5, 7, and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Sharp et al., “Optimal Preview Car Steering Control,” published in *Vehicle System Dynamics*, Volume 35, no. ICTAM, in 2001.

As per claim 1, Sharp discloses a simulation system for simulating an operation of an automotive vehicle comprising:

- An input providing vehicle information (**page 2 section 2**) and path information (**page 4 section 3**);

- A controller having a vehicle computer model therein (**page 1 last paragraph lines 8-11**), said controller programmed to:
  - Determine a curvature of an intended path from the path information (**page 5 figure 3, taught as computing the road angle**),
  - Determine a look ahead scale factor as a function of the intended path (**page 10, second full paragraph, taught as setting a preview time based on the curvature of the path**),
  - Determine a look ahead point as a function of the look ahead scale factor (**page 10, second full paragraph, taught as using the preview time in order to determine the preview point ahead of the car**),
  - Determine a steering wheel angle input to the computer model by comparing the look ahead point and the intended path (**page 10, second full paragraph, taught as “using the perceived path error to steer the ‘correct’ way”**),
  - Operate the computer model with the steering wheel angle input (**page 5 last paragraph-page 6 first paragraph, taught as using the system with the steering wheel angle input**), and
  - Generate an output in response to the vehicle model and the initial steering wheel input or the first steering wheel input (**page 5 figure 4, taught as the error being based on the steering wheel angle input**).

As per claim 2, Sharp teaches the look ahead scale factor being directly proportional to the curvature of the intended path (**page 10 last paragraph, taught as high oscillation requiring higher preview times**).

As per claim 4, Sharp teaches a method of operating a vehicle computer model having vehicle information (**page 2 section 2**) and path information (**page 4 section 3**) therein comprising:

- Determining a curvature of an intended path from the path information (**page 5 figure 3, taught as computing the road angle**),
- Determining a look ahead scale factor as a function of the intended path (**page 10, second full paragraph, taught as setting a preview time based on the curvature of the path**),
- Determining a look ahead point as a function of the look ahead scale factor (**page 10, second full paragraph, taught as using the preview time in order to determine the preview point ahead of the car**),
- Determining a steering wheel angle input to the computer model by comparing the look ahead point and the intended path (**page 10, second full paragraph, taught as “using the perceived path error to steer the ‘correct’ way”**),
- Operating the computer model with the steering wheel angle input (**page 5 last paragraph-page 6 first paragraph, taught as using the system with the steering wheel angle input**).

As per claim 5, Sharp teaches the look ahead scale factor being directly proportional to the curvature of the intended path (**page 10 last paragraph, taught as high oscillation requiring higher preview times**).

As per claim 7, Sharp teaches a method of operating a vehicle computer model having vehicle information (**page 2 section 2**) and path information (**page 4 section 3**) therein comprising:

- Determining a curvature of an intended path from the path information (**page 5 figure 3, taught as computing the road angle**);
- Determining a look ahead scale factor as a function of the intended path (**page 10, second full paragraph, taught as setting a preview time based on the curvature of the path**);
- Determining a look ahead point as a function of the look ahead scale factor (**page 10, second full paragraph, taught as using the preview time in order to determine the preview point ahead of the car**);
- When the vehicle is not on target, determining a steering wheel angle input to the computer model by comparing the look ahead point and the intended path (**page 10, second full paragraph, taught as “using the perceived path error to steer the ‘correct’ way”**);
- Operating the computer model with the steering wheel angle input (**page 5 last paragraph-page 6 first paragraph, taught as using the system with the steering wheel angle input**); and

- When the vehicle is not on target, maintaining a previously determined steering wheel angle (**page 6 last paragraph – page 7 first paragraph, taught as when q1 and q2 are low, which keeps the vehicle on target, the steer angle is maintained**).

As per claim 8, Sharp teaches the look ahead scale factor being directly proportional to the curvature of the intended path (**page 10 last paragraph, taught as high oscillation requiring higher preview times**).

***Claim Rejections - 35 USC § 102/103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 3, 6, and 9 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Sharp as applied to claims 1, 2, 4, 5, 7, and 8 above.

Sharp teaches the look ahead scale factor being about 62 percent of a maximum scale factor (**page 10 second full paragraph, taught as the scale factor being 1.5 at high speeds or 1, which is 2/3 of the maximum of 1.5, at low speeds**).

However, it is unclear how close to 62 percent of the maximum scale factor the look ahead scale factor would have to be in order to satisfy the scope of the claim. In any case, if the instant application were to require a look ahead scale factor of 62 percent of the maximum scale



factor, this would be an obvious design choice at the time of the present invention. The motivation for doing so would be to decrease the scale factor in the case of aggressive driving in order to obtain a closer look ahead point.

### *Conclusion*

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

“Automated Steering Control System Design for Passenger Vehicle in Consideration of Steering Actuator Dynamics,” by Fujiwara et al., published in the Proceedings of the American Control Conference in May 2002, discusses modeling of automated steering.

“Fault Tolerant Force Feedback Actuator for Steer-By-Wire,” by Krautstrunk et al., published in Mechatronics 2000 discusses a control system of a steer-by-wire steering system.

“Development of an Automated Steering Vehicle Based on Roadway Magnets – A Case Study of Mechatronic System Design,” by Tan et al., published in the IEEE/ASME Transactions on Mechatronics in September 1999, discusses automated highways and control systems implemented into vehicles for automated steering systems.

“Cooperative Steering System Based on Vehicle Sideslip Angle Estimation from Side Acceleration Data at Percussion Centers,” by Hiraoka et al., published in the IEEE Vehicle Electronics Conference in 2001, discusses monitoring path following capability based on a combination of manual steering with automatic steering.

“A Framework for Modeling Human-like Driving Behaviors for Autonomous Vehicles in Driving Simulators, by Al-Shihabi et al., published by ACM in 2001, discusses simulation of human-like driving behaviors for the design of autonomous vehicles.

“Robust Control with Decoupling Performance for Steering and Traction of 4WS Vehicles Under Velocity-Varying Motion,” by Yingmin Jia, published by IEEE in 2000, discusses modeling of side forces of a vehicle in motion based on acceleration and braking.

“Vision-Based Lateral Control of Vehicles,” by Kosecka et al., published for the University of California at Berkeley in 2001, discloses an automated steering system using computer vision for look ahead.

US Patent No. 6,789,017, issued to Aanen et al. on 9/7/2004, discloses a system for calculating a steering angle position based on signals received from relative positions.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimberly Thornewell whose telephone number is (571)272-6543. The examiner can normally be reached on 8am-4:30pm M-F.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571)272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kimberly A. Thornewell  
Patent Examiner  
Art Unit 2128

KAT



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SUPERVISORY PATENT EXAMINER